Yarway 9300 Series ARC® Pump Protection Valve

For Low Energy Centrifugal Pumps

Self-contained valve functions as a check valve, flow sensing instrument bypass control valve and pressure reduction valve.

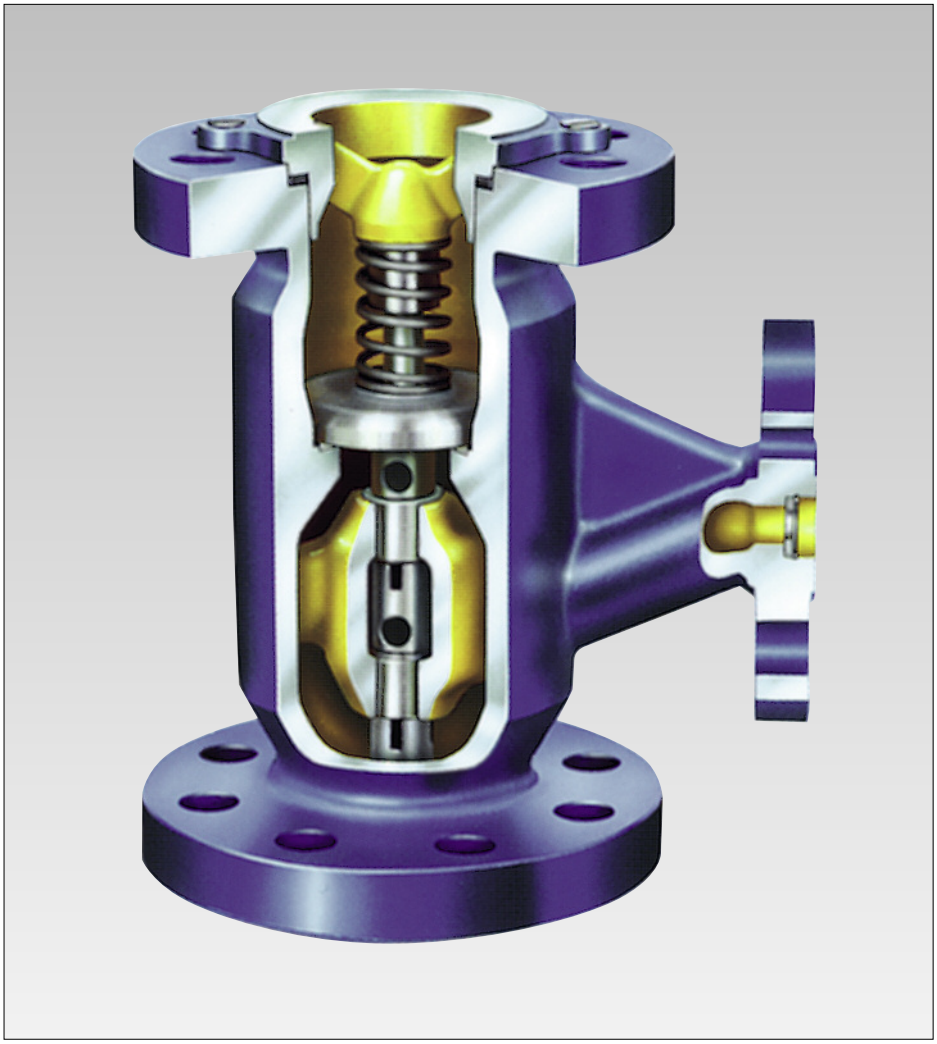
The Yarway 9300 Series ARC® valve has been designed and manufactured to provide cost effective protection for low energy, centrifugal pumps. These pumps often operate far from BEP (Best Efficiency Point) and have shown a propensity for premature wear and failure. Low pump flow conditions can cause: excessive fluid temperature rises, flashing, cavitation, impeller recirculation, vibrations and shaft deflections. This can result in costly failures of bearings, impellers, couplings, mechanical seals, and system downtime.

The 9300 Series ARC® provides the most reliable and economical system to protect centrifugal pumps from the dangers of low and/or reverse flow. It combines the functions of a check valve, flow sensing element, minimum flow control device and pressure letdown into a single unit. The ARC® valve requires no external source of power and installs vertically or horizontally on the discharge side of the pump, with only three connections. The valve is available with ANSI, DIN, BS and JIS connections. ARC® valves have delivered consistent and reliable service for over three decades.

How it Works

Within the 9300 recirculation valve is a main flow sensing/check valve disc which responds to flow. The check valve disc modulates to the demand for process main flow.

When the disc is closed, there is no main flow and the bypass is fully open. Flow enters the bypass section through the slotted orifices in the lower portion of the disc stem. Flow continues through the bypass (annular) area and is directed to the side outlet of the valve. This protects the pump against “dead heading” when the discharge valve is closed or when the process demand drops below the minimum pump flow.



As the disc lifts in response to an increase in main flow (process demand), the orifices in the disc stem are progressively shut off, thus reducing the recirculation flow. When the flow to the process exceeds that required to meet the minimum flow to satisfy proper pump operation, the bypass flow control element will be fully closed, shutting off all recirculation flow.

Features

Provides four functions: Check Valve, Flow Sensing Instrument, Bypass Flow Control Valve and Pressure Reduction.

1. Installation simplicity
2. Field configurable bypass
3. Cost effective
4. Environmentally and intrinsically safe
5. Design simplicity
6. Uses no external power

tyco Flow Control

YAWMC-0419-US-0909

Sizes/Ratings/Connections

Nominal Diameter, Inch [mm]

Inlet x Outlet		x Bypass	
1 1/2 x 1 1/2	[40 x 40]	3/4	[20]
2 x 2	[50 x 50]	1	[25]
3 x 3	[80 x 80]	1 1/2	[40]
4 x 4	[100 x 100]	2	[50]

Ratings

a. ASME B 16.34 Class 150 and 300

b. Pressure/Temperature ratings for valves with ANSI Class 150, DIN, JIS or BS flanged connections will be based on the rating of the flanges or by the ANSI Class 300 rating for CF8M material, whichever is lower.

c. ASME B16.34 flanged valves are in compliance with European Union (EU) Pressure Equipment Directive (PED) 97/23/CE Cat. III and ATEX Directive 94/9/EC Group II Cat. 2 and 3.

d. Maximum valve inlet pressures and temperatures:

Carbon Steel 350 psig [24.7 bar]
-20°F to 500°F [-29°C to 260°C]

Stainless Steel 350 psig [24.7 bar]
-50°F to 500°F [-46°C to 26°C]

Connections

ASME B16.5	Raised Face
DIN 2501	Raised Face
BS 4504	Raised Face
JIS B.22.10	Raised Face

Typical Applications

Direct Drive Centrifugal Pumps, Canned Motor Pumps, Mag Drive Pumps, ANSI/API and other Centrifugal Pumps for water and process fluid – transfer, loading, boosting, recycling, circulation, feeding or draining.

The Yarway ARC valves were developed to fill the pump protection need of the following industries: API Hydrocarbon, Chemical (CPI), Industrial Power, Agricultural, Municipal, Commercial, HVAC and Pharmaceutical.

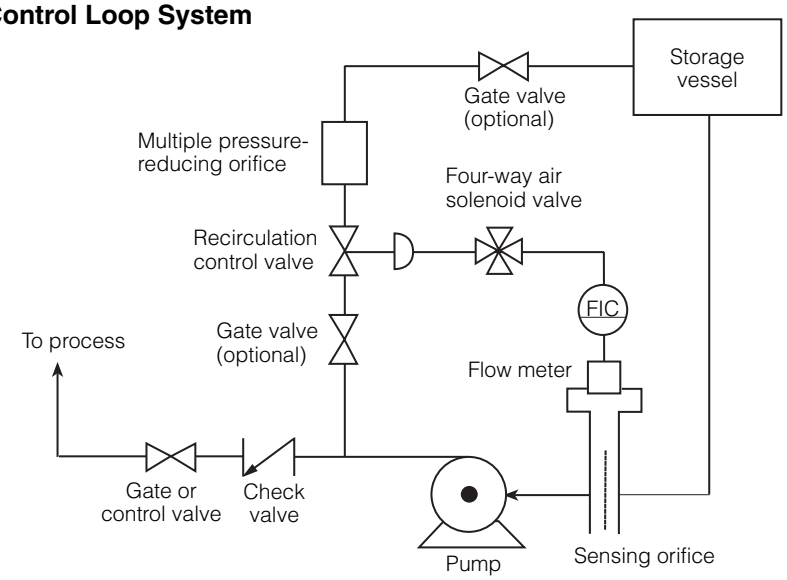
Nominal Main Flow

(gpm[m^3/hr] @ Specific Gravity = 1)

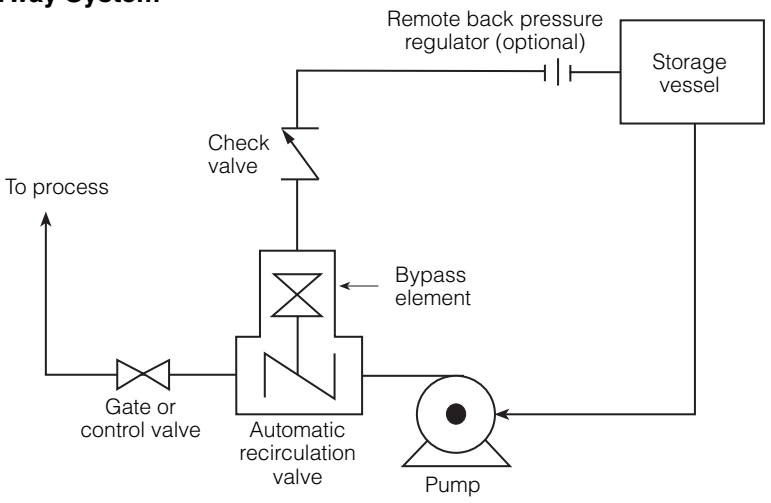
1 1/2 in. [DN 40]	2 in. [DN 50]	3 in. [DN 80]	4 in. [DN 100]
22-110	70-190	180-430	360-765
[5-25]	[16-43]	[41-98]	[82-174]

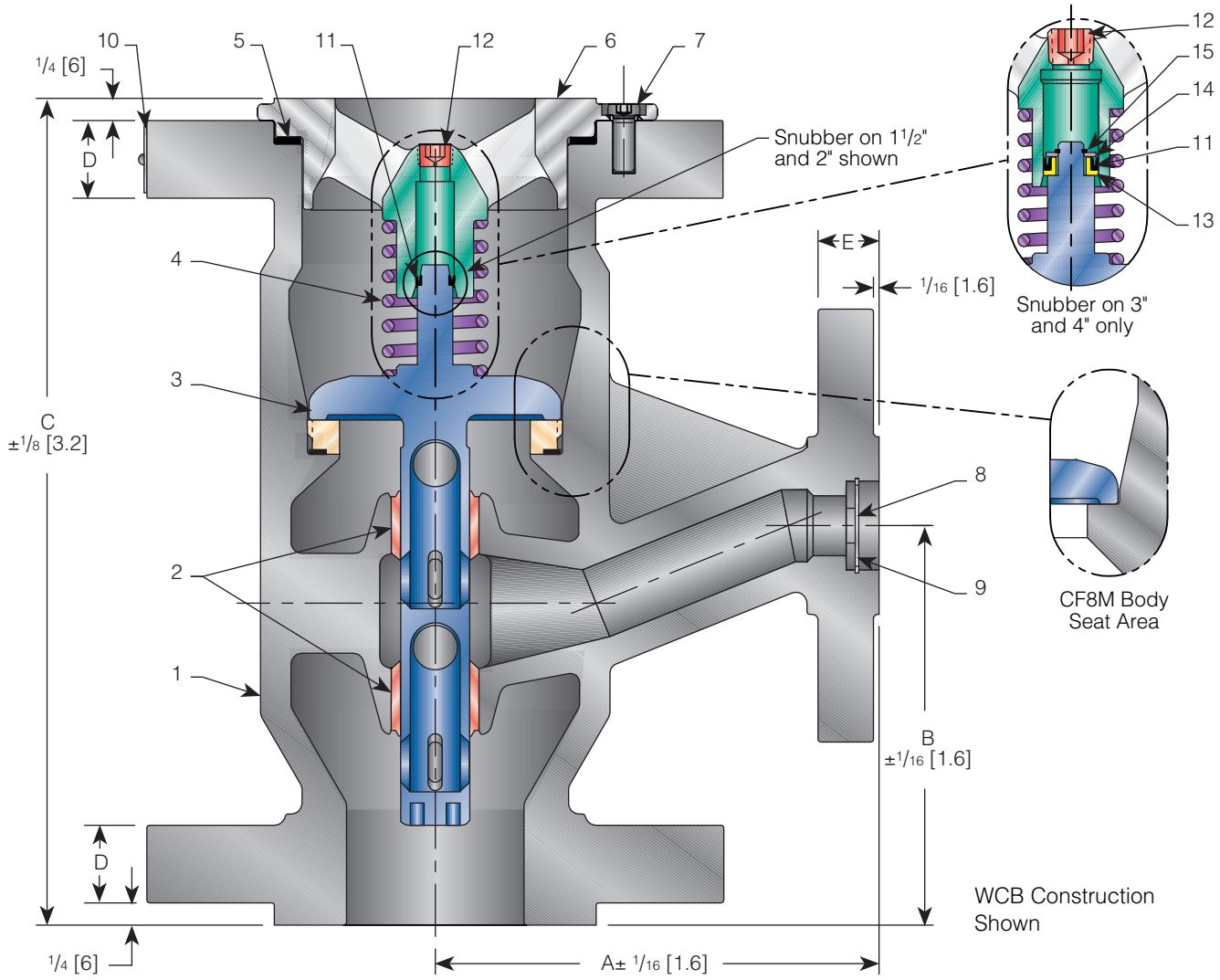
By changing the orifice (#8), the user can configure valve to pump bypass flow requirements.

Control Loop System



Yarway System





Parts and Materials

Item	Part	Material
1	Body	ASTM A216 WCB (with SST hard seat) or ASTM A351 Gr. CF8M
2	Bushing	Nitronic 60
3	Disc	ASTM A351 Gr. CF8M
4	Spring	Type 316 SST
5	Gasket	Graphite
6	Upper Stop	ASTM A351 Gr. CF8M
7	Screw (Hold Down)	Type 18-8 SST

Item	Part	Material
8	Orifice	Type 18-8 SST
9	Retainer Ring	Type 18-8 SST
10	Nameplate	300 SST
11	Seal	TFE/SST
12	Orifice Plug	Type 18-8 SS
13	Snubber Ring	AISI 316
14	Washer	AISI 316
15	Retainer Ring	PH 15-7 SST

Dimensions, in. [mm], Weights, lbs. (kg)

Size	A	B	C	D	E	Weight
1 1/2 x 1 1/2 x 3/4 [40 x 40 x 20]	4 1/2 [114]	4 3/8 [111]	8 3/4 [222]	7/8 [22]	45/64 [18]	27 (12.2)
2 x 2 x 1 [50 x 50 x 25]	5 [127]	4 1/2 [114]	9 5/16 [237]	7/8 [22]	25/32 [20]	35 (15.8)
3 x 3 x 1 1/2 [80 x 80 x 40]	6 1/4 [159]	6 3/8 [162]	13 1/2 [343]	1 1/8 [28.6]	7/8 [22]	72 (32.7)
4 x 4 x 2 [100 x 100 x 50]	7 1/4 [184]	8 3/4 [222]	17 1/4 [438]	1 1/4 [32]	7/8 [22]	124 (56.2)

How to Order

Our sales representatives will help you select the correct valve for your application.
Please complete this form before contacting the sales office to help ensure all necessary information is provided.

Automatic Recirculating Control (ARC®) Valve Data Sheet

Customer:
Company:
Project:
Location:
Phone: E-Mail:
Qty Required: Delivery Required: Additional Info:
Tag(s) ID:

Pump Flow — Please Complete Flow Requirements

Normal -Process- flow:		GPM☐ M³/H☐ BPD☐
Maximum -Process- flow:		
Minimum -Process- flow (optional):		(if Minimum Flow is to be considered in sizing)
Minimum pump protection flow:		(Minimum required "Recirculation Flow")

Pump Discharge Pressure — Please Complete Pressure Requirements

Pump pressure at Shut-off (zero flow):		psi☐ bar☐ KgF/cm²☐ Kpa☐
Pump pressure at Normal -Process- flow:		
Pump pressure at Minimum -Process- flow (optional):		(if Minimum Flow is to be considered in sizing)
Pump pressure at Minimum pump protection flow:		(at Minimum required "Recirculation Flow")
ARC Valve Bypass line pressure:		(Line pressure at ARC Valve bypass port)

Temperature — Please Enter Both Temperatures

Normal temperature at ARC Valve:		°F☐ °C☐
Maximum temperature at ARC Valve:		

Fluid

Liquid: Boiler Feed Water (In this case disregard S.G. and V.P.)
Other (Please specify) _____

Specific Gravity:
Vapor Pressure:
Viscosity:

Orientation of ARC Valve: Vertical☐ Horizontal☐

Desired End Connections:
- Raised Face Flange ☐
- Ring Type Joint (RTJ) ☐
- Flat Face Flange ☐
- Butt Weld Ends ☐
- Other - Specify in "Comments" ☐

Desired Pressure Class: 150☐ 300☐ 600☐ 900☐ 1500☐ 2500☐

Desired Body Material:
- A216 Gr. WCB ☐
- A351 Gr. CF8M ☐
- A351 Gr. CK3MCuN (6Mo) ☐
- A995 Gr. CD3MWCuN (Super Duplex) ☐

Desired Seal Material (except 2" to 8" 9200 and 9300):
- Ethylene Propylene (EPR or EPDM) ☐
- TFE Propylene (Aflas or Fluoraz) ☐
- Fluorocarbon Rubber (Viton®) ☐
- Other - Specify in "Comments" ☐

Pump Drive Type:
- Constant Speed - Motor Driven ☐
- Variable Speed (VFD) - Motor Driven ☐
- Variable Speed - Turbine Driven ☐
- Other - Specify in "Comments" ☐

Comments:

NACE Materials Required? ☐
Flow Test with Performance Certificate Required? ☐
Customer Inspection Required Prior to Shipment? ☐
Certificate of Compliance for Hydro Test Required? ☐
Magnetic Particle Test Required? ☐
Radiograph Inspection Required (specify scope)? ☐
Certified Material Test Report (Pressure Containing Components only)? ☐

Flow tests are generally conducted on all model 5300 and 7100 ARC® valves and one model 9100 or 9200 ARC® valve per sales order line item at no additional cost. Model 9300 ARC® valves and other flow test requirements are upon request and at additional cost. If flange drilling is other than ANSI, please specify in "Comments." Please include Pump Curve if available.